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WO 96/26755 A

GB 1005768 A

US 5310086 A

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INT CL⁷ B65D 83/14 83/16

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(54) Abstract Title

A key operated secure dispensing apparatus for materials

(57) A secure dispensing apparatus comprising a housing 10; an axial compression dispensing device 1, eg an aerosol, and a plate and stem member 30, positioned within the housing, and a key disc 39. The device is activated by prongs 38, of different height on the key disc, passing through holes 36 in a lower end wall 11 of the housing and engaging with and displacing corresponding posts 35 which causes the plate and stem member 30 to be displaced to axially compress dispensing device 1 and dispense material through a nozzle 16 in a cap 13. If only one peg 35 is engaged and displaced the lower plate 34, of the plate and stem member 30, will be tilted causing the stem 33, of the plate and stem member 30, to fracture and the device be rendered inoperable.

The apparatus may be used in conjunction with an actuation mechanism (figures 2 - 9), and the prongs may have differing cross-sections.

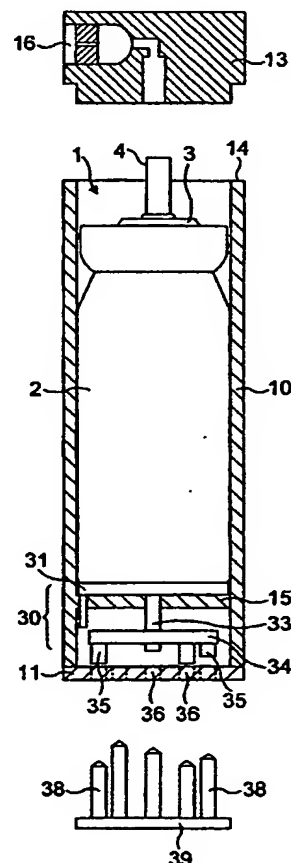


FIG. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy. This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

The print reflects an assignment of the application under the provisions of Section 30 of the Patents Act 1977.

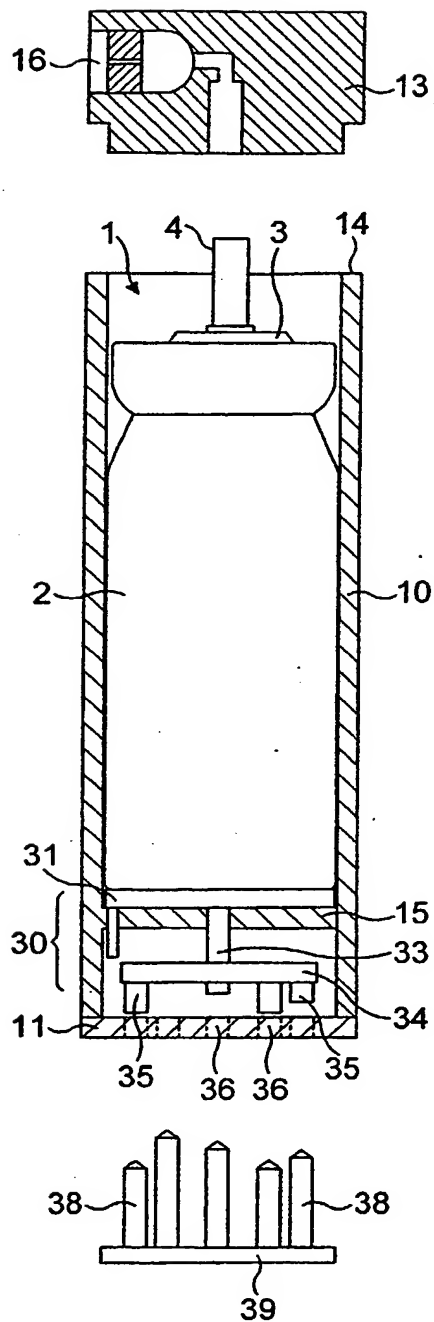


FIG. 1

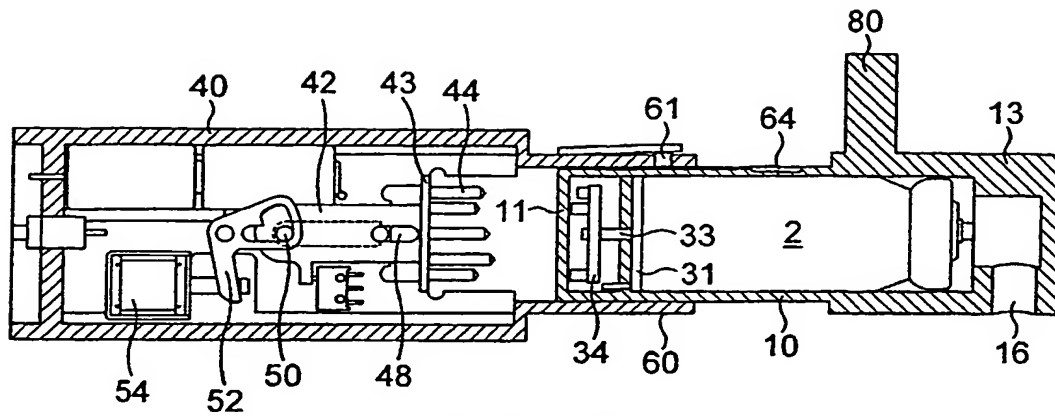


FIG. 2

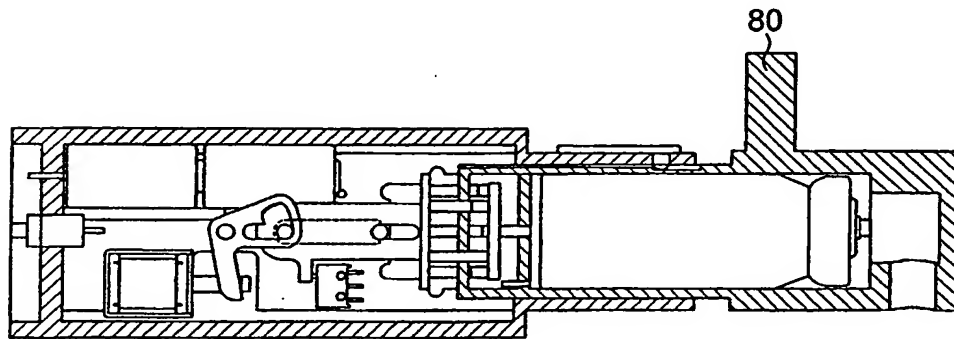


FIG. 3

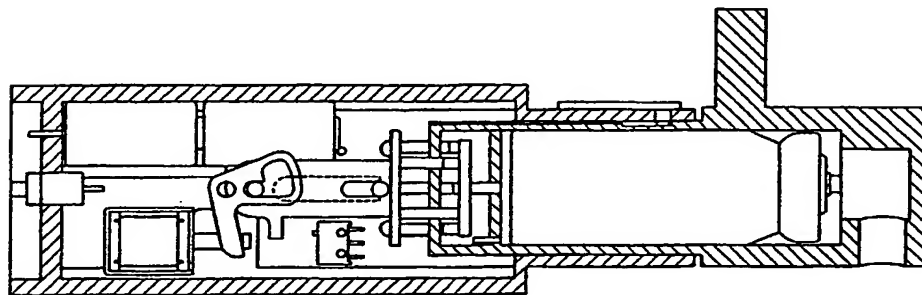


FIG. 4

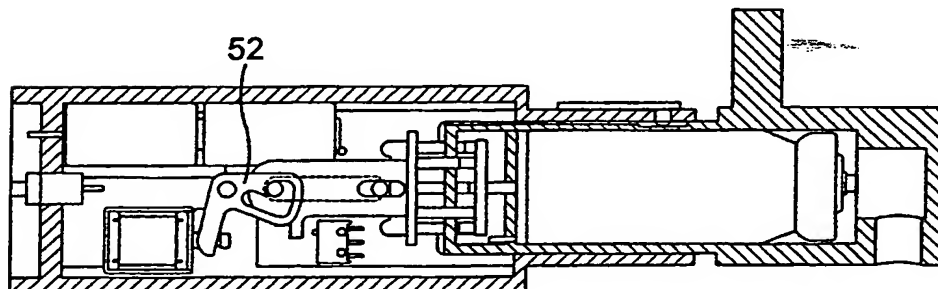


FIG. 5

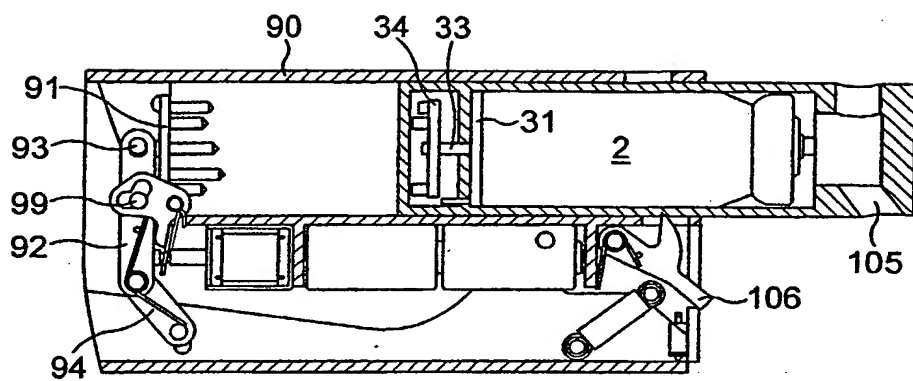


FIG. 6

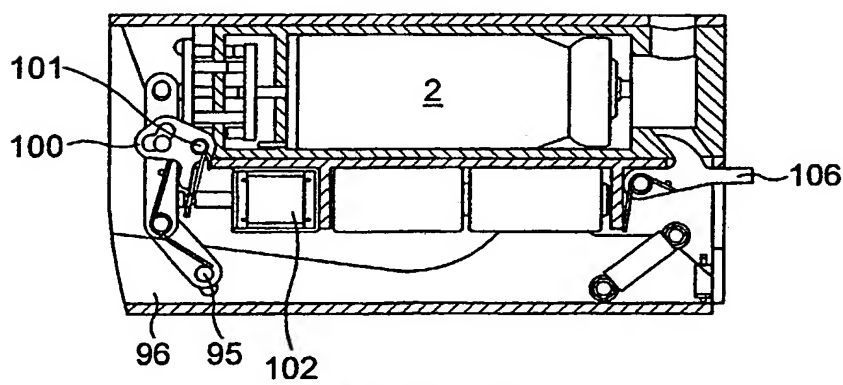


FIG. 7

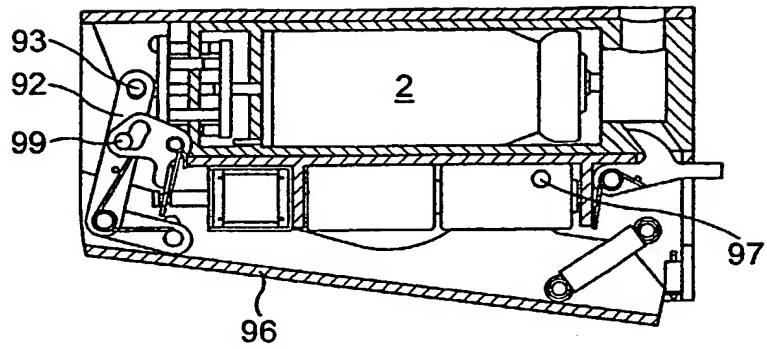


FIG. 8

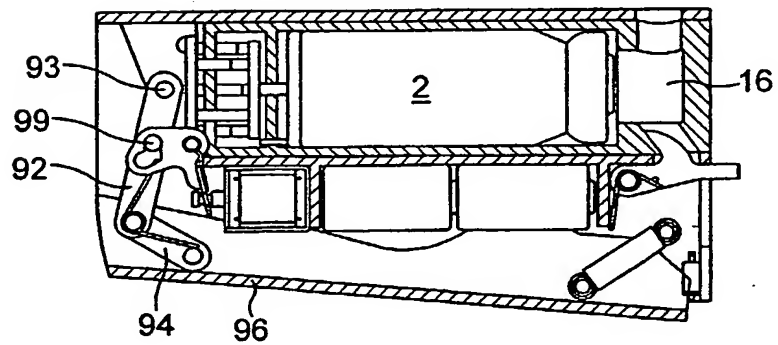


FIG. 9

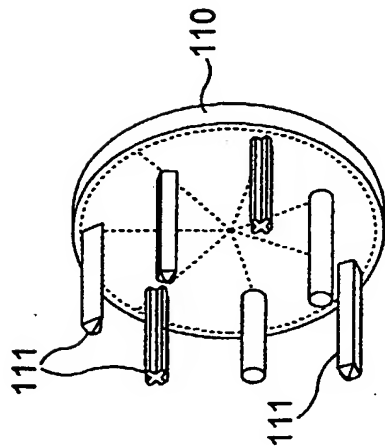


FIG. 10

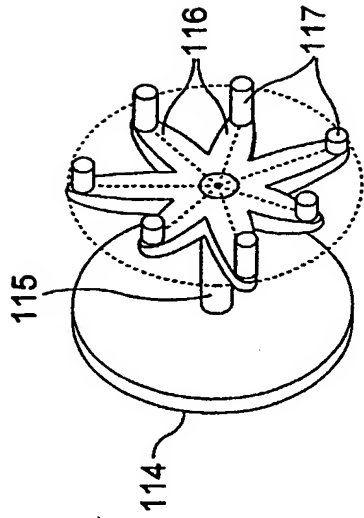


FIG. 11

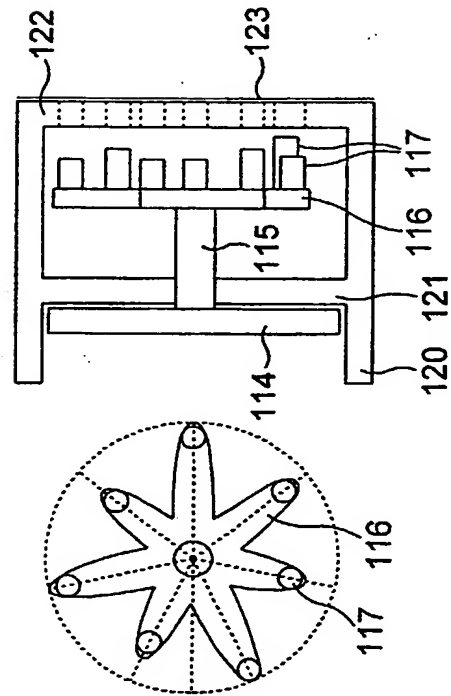
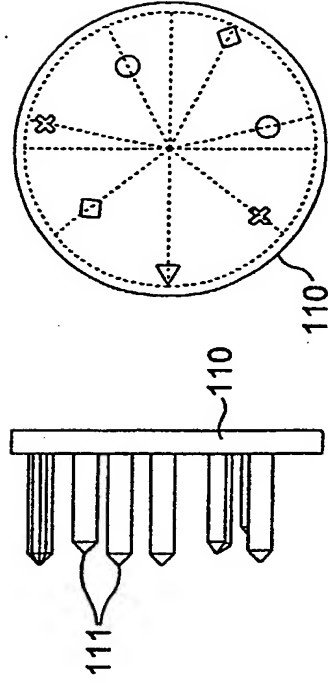


FIG. 12



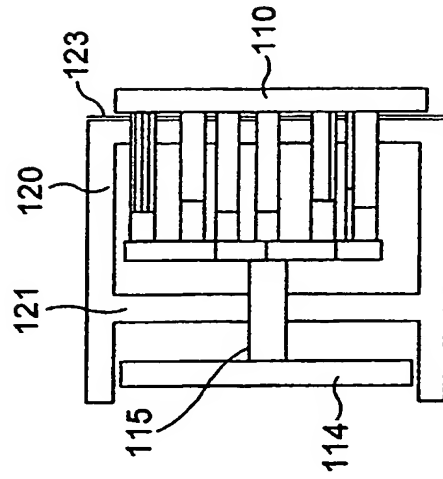


FIG. 13c

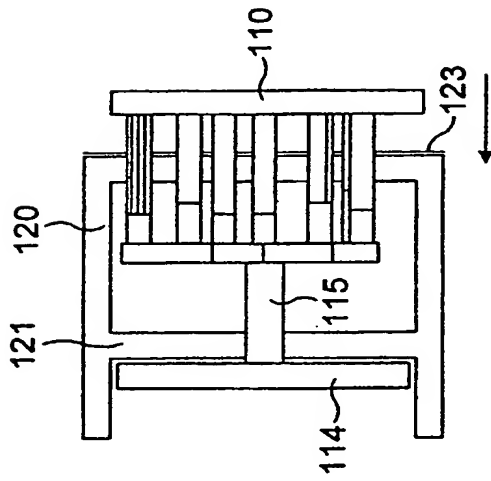


FIG. 13b

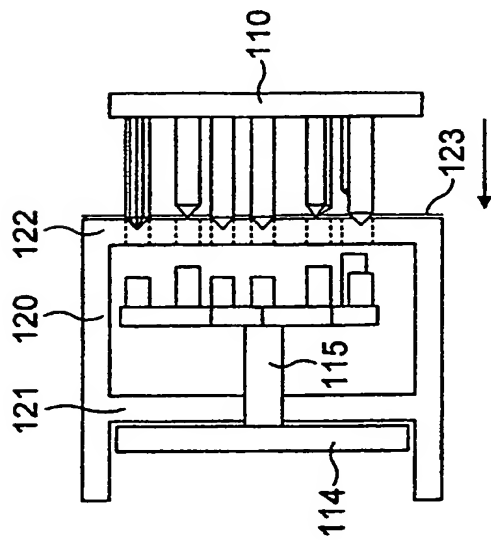


FIG. 13a

- 1 -

SECURE DISPENSING OF MATERIALS

This invention relates to the secure dispensing of materials and particularly to the packaging of dangerous
5 products such as drugs, poisons, toxic materials or the like.

There are numerous circumstances in which it is desired to
able to dispense materials in a secure fashion, in
10 particular in order to restrict the amount of material
dispensed on the one hand and separately to prevent access
to the entire quantity of material save by someone entitled
or authorised to dispense such material, for example for
self-medication.

15

It has long been recognised that packaging can play an
important part in securing, for example, drugs against
being consumed by children. There are numerous packaging
designs which are designed with "child-proof" closures.
20 While these may provide a certain degree of effectiveness,
once the closure is opened, there is generally then no
further barrier to access to the entire content of the
container and thus to whatever material is within. This is

- 2 -

clearly unsatisfactory and potentially unsafe.

The present invention provides an alternative approach and makes use of the fact that many materials can be presented in a dosable form in some sort of container from which a quantity or unit of material can then be dispensed by appropriate action on the container. By way of example only, and these examples are taken from the field of pharmaceuticals, though the area of application of the invention is rather wider, elongate sealed canisters are widely used for the dispensing of drugs for asthmatics, with the inside of the canister being under pressure and containing a liquid material which may be dispensed as an aerosol spray by placing an axial outlet tube forming part of the canister into an aerosol nozzle and depressing the nozzle with respect to the main body of the canister. Pump action dispensers for pasty materials such as toothpaste are known which likewise are actuated by axial pressure on an elongate container, and recently homeopathic medicines have been dispensed in elongate cylindrical containers which contain an internal mechanism enabling the dispensing one-by-one of small pills of homeopathic remedy contained within the housing. In all of these cases, dispensing is achieved by axial compression of the container containing the material it is desired to dispense. Such a form of container is denoted herein by the term "axial compression dispensing device".

In accordance with the present invention, there is provided a secure dispensing apparatus which comprises an axial compression dispensing device surrounded by a housing, the housing having an aperture registered with a dispensing aperture of the axial compression dispensing device, and having a central chamber surrounding the axial compression dispensing device and of axial length slightly longer than that of the axial

compression dispensing device, and means at one end of the chamber movable with respect thereto to compress an axial compression dispensing device located within the chamber, whereby to cause dispensing via the dispensing
5 aperture, wherein the means comprises a central breakable axial stem attached to a pressure plate, the pressure plate having a surface configuration on its side facing away from the axial compression dispensing device providing a set of surfaces not in a plane
10 transverse to the axis of the breakable stem, and apertures in the end of the outer housing aligned with the set of surfaces of the pressure plate and none of the apertures being coaxial with the breakable stem, and wherein means are provided to limit the amount of
15 movement of the pressure plate away from the end of the outer housing containing the set of apertures.

Such a presentation for containing a dispensable material is highly secure. In order to dispense the
20 material, the set of surfaces on the pressure plate must be subjected to from outside the housing by application thereto of elongate members inserted through the apertures in the end of the housing in such a way that the force applied to the pressure plate at the set of
25 surfaces, all of which are spaced away from the axis of the stem are such as to cause the pressure plate to move in a direction parallel to the axis of the break stem. Because the set of surfaces of the pressure plate accessible through the apertures in the end of the outer
30 container do not lie in a plane transverse to the axis of the stem, this means that in order to cause the plate to move in the direction of the axis of the stem, pressure must be applied to it evenly by two or more elongate members inserted through the apertures, but
35 inserted by different degrees. If it is attempted to move the plate axially by pushing on it unevenly, for example by inserting just a single elongate member

through one of the apertures in the end of the outer container, the pressure plate will swivel causing the stem to snap. Once it has been caused to snap, it can no longer transmit push via the stem to one end of the axial compression dispensing device, and accordingly, because the pressure plate cannot move far enough away from the end of the housing in which the set of apertures are located, that device cannot be compressed and nothing can be dispensed. Its contents are accordingly protected against access by unauthorised persons or children, for example.

It will be seen at once that if a "key" consisting of a base member bearing a number of elongate members parallel with one another and of different lengths, the end points of the members being located in a configuration matching the configuration of the set of surfaces of the pressure plate, is inserted through the apertures in the outer container, and moved in the direction of the axis of the stem, pressure will be applied evenly to the pressure plate and dispensing will take place. The lengths of the individual elongate members forming part of such a key can be thought of as analogous to the depths of V-shaped grooves cut into keys for operating a standard "cylinder lock". In that case, the lock can only be opened when spring transversely split axially movable pins are individually located so that the splits in them line up flush with the wall of a block in which the cylinder may be turned with the key. They line up flush when the correct key is inserted. With an incorrect key inserted, one or more of the transversely split pins has its transverse split otherwise than at the surface of the cylinder and the pin accordingly acts to prevent the cylinder being turned and thus the lock being opened. In the device in accordance with the invention, an analogous process is used to ensure that the correct "key" will enable the

axial compression dispensing device to be axially compressed. Use of an incorrect key, or trying to cause such dispensing without having a key, will result in the fracture of the stem of the member adapted to enable
5 dispensing to take place and accordingly render the device safe.

A wide variety of keys may be produced to match a wide variety of pressure plates and outer casing aperture
10 patterns. Preferably the number of apertures is 5 to 7 and preferably these are substantially equiangularly spaced around the axis of the frangible stem, most preferably substantially equidistantly from the axis of that stem in a radial direction. The shape of the
15 apertures may vary, and a single key may have means to pass through the apertures of likewise varied shape, e.g. round, square, triangular or cruciform in cross-section.

20 It will be clear that the act of dispensing depends heavily on being able to exert direct axial pressure on the axial compression dispensing device and that in turn depends on exerting accurately axial pressure on the pressure plate. If the housing is to be held in the
25 hand and the key simply pushed in at the end remote from the dispensing aperture, this can be achieved by dimensioning the apertures in the end wall of the outer casing which covers the pressure plate so that they act as guide elements, preferably with the wall thickness of
30 the end of the housing greater than the transverse measurement of the elongate members on the "key" which are to come into contact with the set of locations on the side of the pressure plate remote from the axial compression dispensing device. It is also important to
35 ensure that the axial compression dispensing device is a relatively close fit in the housing. If the device is externally a simple cylinder, then a plain cylindrical

cavity in the housing is sufficient. If, for example, because it has an enlarged cap portion, the exterior of the device is a stepped cylinder, the housing interior may be correspondingly stepped, e.g. with a wider
5 portion to accommodate the end cap and a narrower part to give good guidance to the body of the device.

Alternatively, if the apparatus is to be used in a dispenser which is e.g. adapted to maintain a record of
10 dosage times, or to prevent dosage save at predetermined intervals, such as described in our patent application filed simultaneously with this application, then the key may be fitted in the dispenser and the apparatus likewise fitted in the dispenser, e.g. in a tubular
15 close-fitting channel therein, conveniently with a pin and slot location to ensure correct alignment around the long axis of the apparatus. In this case, the dispenser provides accurate guidance even if the holes are larger than the pins on the key. If, prior to first use, the
20 holes are covered with a frangible seal, the pins pierce the seal on first use. Such a seal is valuable as showing evidence of tampering if, for example, someone has tried to cause the apparatus to dispense a medicament without using the dispenser which contains
25 the correct key.

The dispensing devices of the present invention are particularly useful as replaceable drug-containing units in dispensing apparatus which may be configured to move
30 the "key" in known fashion to dispense an appropriate dose of material. If the drug dispensed by a pharmacist is presented in such a secure fashion, together with a key, the key and dispensing container can be separated from one another and someone who comes across the
35 dispensing container will not be able to dispense any material from it unless they also have the key.

The invention is illustrated by way of example with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic sectional view of a secure
5 dispensing device in accordance with the present invention;

Figures 2, 3, 4 and 5 show a device in accordance with the present invention located in a dispenser actuation
10 mechanism described in more detail below, Figures 2 to 5 showing the item in different positions of the dispensing device;

Figures 6 to 9 inclusive show similar views to Figures 2
15 to 8, but in connection with an alternate design of drug-dispensing actuation device;

Figures 10 and 11 show in perspective view a key and corresponding pressure plate assembly;
20

Figure 12 shows the key and pressure plate assembly in side view and aligned with diagrammatic end views of each, and

25 Figure 13a to d show three stages of use of the key, diagrammatically.

Referring first to Figure 1, this shows in diagrammatic sectional form a simplified secure dosage container in
30 accordance with the present invention. Denoted 1 is a standard small elongate pressurised aerosol container which has a generally cylindrical body 2 between a lower flat end and an upper end which is sealed by a swaged-on cover 3 carrying a valve housing with protruding valve
35 stem 4. The contents are pressurised and there is a dip tube so that if valve stem 4 is moved downwards, material is dispensed from within pressurised container

1.

The outer housing consists of a generally cylindrical sleeve 10 having a transverse lower end wall 11, an
5 intermediate apertured transverse wall 15 and a cap 13 which can be welded to the end of the cylindrical sleeve 10, e.g. at 14. Cap 13 includes an aerosol dispensing nozzle 16 of known design which is set substantially in the centre of the cap and aligned appropriately with a
10 transverse passage in the cap through which the nozzle can be seen in the drawing. Cap 13 is e.g. ultrasonically welded to the edge 14 of cylindrical portion 10 when the outer housing is assembled around the canister 2 and a plate and stem member generally
15 denoted 30 shown in the drawing.

Plate and stem member 30 consists of, as seen in the drawing, an upper plate 31 adapted to contact the underside of body 2, a fracturable axial stem 33, and a
20 lower plate 34 from which project a number (four are as shown in the drawing) of downwardly directed posts 35. These posts are of different downward axial extent and they are sized and located to match apertures 36 located in the end wall 11 of the outer casing. The stem member
25 30 passes through an aperture in the centre of transverse wall 15.

The dimensions of the various components are so chosen that when the cap 13 is ultrasonically welded to edge
30 14, the plate and stem member 30 and pressurised canister 2 effectively occupy substantially the entire axial length of the interior of the outer housing.

The thickness of end wall 11 is chosen such that
35 apertures 36 may provide axial guidance to a set of prongs 38 located on a key disc 39. Prongs 38 are of different heights corresponding to the heights of

downwardly depending posts 35 on disc 34, and the arrangement of the prongs 38 is such that they can be registered with holes 36 and the ends of prongs 38 then brought simultaneously into contact with the ends of
5 posts 35. Further axial movement than that necessary to effect such contacting means that the disc 34 moves further away from wall 11, and disc 31 exerts pressure on the base of the pressurised canister 2 which, because it can move relative to the cap 13 which holds the
10 nozzle, moves the dispensing tube 4 into the container, thus releasing material under pressure via nozzle 16.

If an attempt is made to effect such dispensing by pushing a prong through a single one of apertures 36,
15 although it may contact the end of one of the downwardly depending posts 35, as soon as any pressure is applied, this will cause disc 34 to tilt, stem 33 to bend and then immediately break, and thereafter the pressure plate 31 cannot be raised by axial force transmitted
20 through stem 33. Furthermore, it is not then possible to move canister 2 up by pushing a prong further in through hole 36, as plate 34 can only move up until it contacts the transverse fixed wall 15. Because the transverse wall 15 is fixed, although pushing a prong in
25 through aperture 36 enables plate 34 to be abutted against wall 15, but not allow it to be moved any further, and in particular, because stem 33 is already broken, it does not allow pressure plate 31 to exert any pressure on the bottom of canister 2 which might effect
30 dispensing.

As can be seen by contemplating Figure 1, the secure dispensing container needs to be provided with a key to enable material to be dispensed from it, the key
35 consisting of key disc 39 with the actuating posts 38 of different heights on it. An additional benefit of the particular presentation shown in Figure 1 is that it is

easy to position a seal across the end of wall 11 covering the apertures 36, which seal must be pierced by the prongs 38 when the dispensing device is first used, or which must be torn off in order to provide access to
5 apertures 36 for posts 38. In either event, it is clear whether the dispensing device has been put to use or not.

The device of Figure 1 is shown in Figures 2 to 9
10 forming part of a drug-dispensing system into which the device may be inserted. Referring first to Figures 2 to 5, the system comprises a housing 40 containing within it an axially movable member 42 carrying at one end a key disc 43 having a number of different length prongs
15 44 protruding from it. Member 42 is guided axially within the housing and can be moved to the left of the position shown in Figure 2 by a short distance determined by the length of a slot 48 therein. One end of member 42 bears a protruding pin 50 which is
20 surrounded by an aperture formed in one end of a flat rocker arm 52, the position of which is controlled via a solenoid 54. In the position shown in Figure 2, the member 42 can move axially to its fullest extent, while in the position shown in Figure 5 with the solenoid
25 actuated, the pin 50 can only move a short distance before coming to rest on a shoulder within the rocker plate 52. It should be understood that the side view shown shows only one pin 50 and rocker plate 52. The device has two such pins and plates, so the opposite
30 side view of Figure 2 is the same, though reversed in sense.

The entire dispensing unit is arranged to be slotted into a sleeve-like extension of housing 40, denoted 16
35 in Figure 2, and it may be held captive therein by means of a sprung bead 61 engaging in a preformed groove 64 running along the side of wall 10. The normally

inserted position is shown in Figure 3, with the bead 61 spring latched into the end of the groove 64 remote from cap 13 and nozzle 16. As can be seen at this point, the prongs 44 are passing through the end wall 11 of the
5 dispensing unit and have come to rest against the left-hand ends as shown in the drawing of the prongs extending from plate 34. Accurate matching may be assisted by having each of the ends of the prongs on plate 34 with a depression in its end and making each of
10 the prongs 44 somewhat pointed, as shown in the drawing.

If the canister 2 is now moved towards the left as shown in Figure 4 with the solenoid 54 unactuated, it simply moves axially slidable member 42 with it. Thus, there
15 is no relative movement between outer housing 10 and the key disc 43 and its prongs 44. The reason for this is that, as noted above, pin 50 can move close to the axis about which rocker plate 52 can pivot.

20 If dispensing via nozzle 16 is required, however, then the solenoid is actuated electrically by suitable means and the rocker plate 52 moves to the position shown in Figure 5. In this position, as soon as the outer housing 10 is moved to the left as shown in that Figure,
25 the pin 50 comes to a halt caught on the shoulder within rocker plate 52 and, at this point, continued movement of housing 10 to the left causes plate 31 to start pressing on the base of pressurised canister 2. As can be seen, stem 33 transmits the force from plate 34 and
30 the entire canister 2 is moved to the right with respect to the housing in which it is placed. The valve stem at the top is accordingly pressed down and material may be released through nozzle 16.

35 The device shown in Figures 6 to 9 operates analogously save that, in this particular case, the mechanism for actuating the dispenser is quite different. In the case

of the device shown in Figures 2 to 5, movement of housing 10 relative to housing 40 is achieved by e.g. engaging the user's finger over a lateral post 80 formed integrally with cap 13 and side wall 10. This is not
5 always a most convenient action and in Figures 6 to 9, a device is shown which can provide a dispensed dose of medicament located in pressurised canister 2 by squeezing two parts of an outer housing together. This is easier to achieve by certain classes of use, for
10 example those whose manual dexterity is impaired by weakness or disease such as arthritis.

As shown in Figures 6 to 9, the outer housing consists of a base portion 90 having a cylindrical cavity in
15 which outer container 10 may be fitted. At one end of the cylindrical cavity, there is provided a key disc 91 which may be moved to the right as shown in Figure 6 by a lever 92 pivoted at 93 to the back of the disc 91. Lever 92 is itself pivoted to a link 94 having a
20 transverse stud at its end 95 which is slotted into an actuating bar 96 which can pivot around a pivot point denoted 97 in Figure 8 to the position shown in Figure 8 and back again. A post 99 on link 92 may move freely within a slot in a rockable plate 100 which is rockable
25 about an axis 101 by means of a solenoid 102.

As shown in Figure 8, if bar 96 is moved up at its left-hand end as seen in the drawing, normally post 99 merely moves to the left and link 92 swivels about pivot 93.
30 If, on the other hand, the solenoid 102 is actuated, then rocker plate 100 moves around pivot point 101 to the position shown in Figure 9, and it can be seen that with plate 100 moved into this position, post 99 cannot move radially away from pivot point 101. Instead, as
35 actuating bar 96 is moved upwards at its left hand end as shown in Figure 9, link 94 causes link 92 to pivot around post 99 which is essentially held stationary.

Pivot point 93 accordingly moves to the right, thus moving in turn the disc 91 and, because the poles on the key disc are now engaged with corresponding prongs on plate 34, and stem 33 passes through wall 31 and acts to push container 2 to the right within the housing, thus causing dispensing via nozzle 16 of a single dose. Dispensing can be stopped by releasing the actuation bar 96 and the device then returns to the position shown in Figure 7.

10

In this embodiment shown in Figures 6 to 9, the secure dispensing assembly consisting of canister 2 and its outer housing has an inclined slot 105 in the cap opposite the dispensing aperture and can be held into the overall body of the device by being engaged by a spring-loaded tooth 106 which is pivotable between the position shown in Figure 6, for loading or unloading a dispensing assembly from the device, and the position shown in Figures 7, 8 and 9, where the tooth is engaged in recess 105 and holds the assembly firmly together.

Figures 10 and 11 show a more sophisticated design of the key disc and plate and stem member. As shown, the key disc has a base 110 bearing seven different cross-section pins 111. The plate and stem member consists of a plate 114 adapted to press the base of a dispensing canister, a frangible stem 115 and a set of seven radial arms 116, each of which has at its outer end a short axial post 117 with a depression at its free end. The posts 117 are of different lengths, complementary to the lengths of pins 111. Figure 12 shows the key disc and plate and stem member aligned with the latter located in a schematically indicated cylindrical casing 120 having a transverse inner wall 121 through which the stem passes, and an end wall 122 having a set of seven apertures in it correspondingly located to the posts 117. Across the end wall 122 is an adhered paper

security seal 123. As can be seen in the diagrammatic face views of the key and plate and stem member, the pins 111 are arranged to mirror (as shown in Figure 12) the posts 117. The end of each pin 111 is pointed.

5

When the device is used, the sequence of movement to effect dispensing is as shown in Figures 13a to c. The key is first pushed towards the wall 122 and as each pin 111 contacts seal 123, it pierces the seal, leaving a distinctive shape if the seal is e.g. of paper. Each
10 pin 111 then comes to engage the end of a post 117 (Figure 13b). Further movement causes the entire plate and stem member to move to the left relative to the casing 120, so moving the canister (not shown) and
15 effecting dispensing. The maximum amount of movement is achieved (Figure 13c) when the base 110 of the key abuts the seal 123.

CLAIMS

1. Secure dispensing apparatus which comprises an axial compression dispensing device surrounded by a housing, the housing having an aperture registered with a dispensing aperture of the axial compression dispensing device, and having a central chamber surrounding the axial compression dispensing device and of axial length slightly longer than that of the axial compression dispensing device, and means at one end of the chamber movable with respect thereto to compress an axial compression dispensing device located within the chamber, whereby to cause dispensing via the dispensing aperture, wherein the means comprises a central breakable axial stem attached to a pressure plate, the pressure plate having a surface configuration on its side facing away from the axial compression dispensing device providing a set of surfaces not in a plane transverse to the axis of the breakable stem, and apertures in the end of the outer housing aligned with the set of surfaces of the pressure plate and none of the apertures being coaxial with the breakable stem, and wherein means are provided to limit the amount of movement of the pressure plate away from the end of the outer housing containing the set of apertures.

2. Apparatus according to Claim 1 wherein the number of apertures in the end of the housing is 5 to 7 and these are substantially equiangularly spaced around the axis of the frangible stem.

3. Apparatus according to Claim 2 wherein the apertures are substantially equidistant from the axis of the that stem in a radial direction.

35

4. Apparatus according to Claim 2 or 3 wherein the apertures are of at least two different shapes.

5. Apparatus according to any one of Claims 1 to 4 wherein the apertures in the end of the housing are covered with a frangible seal.
- 5 6. Apparatus according to Claim 1 and substantially as hereinbefore described with reference to the accompanying drawings.



INVESTOR IN PEOPLE

Application No: GB 0025811.1
Claims searched: 1 - 5

Examiner: David Hotchkiss
Date of search: 10 May 2001

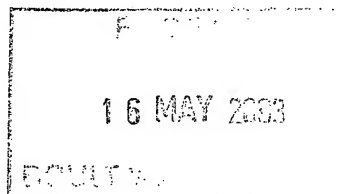
Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK CI (Ed.S): F1R (RDE, RAA); B8D (DFX)
Int CI (Ed.7): B65D (83/14, 83/16)
Other: Online: WPI; EPODOC; JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2061116 A (Heikki Lehti) Whole document especially figures 1 & 2	
A	GB 1005768 A (Christian Dior) Whole document especially figures 1 & 2	
A	WO 96/26755 A (Christoph Thomas Marr) Whole document	
A	US 5310086 A (Helmut Julinot) Whole document	



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& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.